

**Claims**

1. An air flow control valve including:

a valve body having an internal cavity and an inlet and outlet in flow communication with the internal cavity, the axes of the inlet and outlet being aligned at substantially 90° to each other;

5 a valve seat located within the cavity and co-axially aligned with the outlet, the valve seat being located on the distil end of an upstanding tubular pedestal which is formed around the outlet;

the internal cavity being configured so as to define an annular space around the pedestal with which the inlet is in flow communication; ~~so they~~

10 a flexible generally planar diaphragm mounted above the valve seat, the diaphragm supporting a valve closure member which is adapted to engage the valve seat to close the valve;

valve control means for causing the diaphragm to move towards and away from the valve seat to close and open the valve respectively; and

15 the valve being characterised in that, with the valve oriented with the inlet axis horizontal and the outlet facing downwards, the valve seat is located at an elevation ~~at or~~ below the upper most edge of the inlet, and the diaphragm is located at an elevation above the upper most edge of the inlet.

2. An air flow control valve as claimed in claim 1 wherein an uppermost edge of the valve seat is located a distance which is approximately one third the diameter of said inlet above a centre line of said inlet.

20 ~~Sub A1~~ 3. An air flow control valve as claimed in claim 1 or 2, wherein said valve body has a bowl portion in which said inlet and said outlet are located, and a cap portion in which said valve control means is located, said cap portion having screw threads thereon adapted to engage with screw threads on said bowl portion.

4. An air flow control valve as claimed in claim 3 wherein said diaphragm is captively held in position between said cap portion and said bowl portion when said cap portion is operatively screwed onto the bowl portion.

25 ~~Sub A2~~ 5. An air flow control valve as claimed in any one of claims 3 or 4, wherein screw threads on said bowl portion are of female configuration, and threads on said cap portion are of male configuration.

6. An air flow control valve as claimed in any one of claims 1 to 5, wherein the cross sectional area of said bowl portion's annular space relative to said valve seat's area is in the range of 2.5:1 to 4.5:1.

7. An air flow control valve as claimed in any one of claims 1 to 6, wherein the cross sectional area of said bowl portion's annular space relative to said valve seat's area is in the range of 3.2:1 to 3.6:1.

30 8. An air flow control valve as claimed in any one of claims 1 to 7, wherein said valve seat's internal diameter is larger than said outlet's internal diameter.

9. An air flow control valve as claimed in any one of claims 1 to 8, wherein said tubular pedestal's inner wall tapers convergently from said valve seat towards said outlet.

35 10. An air flow control valve as claimed in any one of claims 1 to 9, wherein said inlet and said outlet have a suitable connection arrangement for connecting air flow conduits to said valve.

11. An air flow control valve as claimed in claim 10, wherein said inlet and said outlet both have one of the following: an internally threaded socket adapted to each receive a respective externally threaded conduit; and

externally threaded tubular member to receive a respective internally threaded conduit; or an attached flange adapted to be attached to a flange on a conduit.

*Sub A3)* 12. An air flow control valve as claimed in any one of claims 1 to 11, wherein said diaphragm has a bleed hole therethrough adapted to feed pressurised air from said annular space into a volume above said diaphragm.

5 13. An air flow control valve as claimed in any one of claims 1 to 11, wherein said diaphragm is spring-loaded into engagement with said valve seat.

10 14. A valve body and cover, said valve body including a threaded portion to engage a mating threaded portion on said cover, said body and said cover having respective engagement members which are adapted to engage each other in use, said members being positioned so that said cover, when threaded onto said body, will rotate a necessary number of turns to secure said cover to said body to a predetermined torque, indicated by said engagement members engaging each other preventing any further tightening, said engagement members not engaging or contacting until said predetermined torque is reached.

15 15. A valve body and cover as claimed in claim 14, wherein the threads on said body and cover are arranged to take 1½ turns to secure said cover from first engagement of the threads of said cover and body until engagement of the respective engagement members.

*Sub A4)* 16. A valve body and cover as claimed in claim 14 or 15, wherein said engagement members are located outside of a circumference of said cover.

20 17. A valve body and cover as claimed in claim 14 or 15, wherein said engagement members are located within a circumference of said cover.

18. A valve body and cover as claimed in any one of claims 14 to 17, wherein said cover and said body include a releasable securing means so that said cover cannot be unsecured from said body until said releasable securing means has been released.

25 19. A valve body and cover as claimed in any one of claims 14 to 18, wherein said cover and said body each have an aperture therein so that once said engagement members are engaged, said apertures are aligned so as to receive a locking means.

20. A valve body and cover as claimed in claim 19, wherein said locking means is any one of: a pin; a plastic pin; a cable tie; and a retractable pin.

21. A valve body and cover as claimed in claim 19, wherein said body includes a pressure activated pawl, with said cover having a recess or aperture, whereby when said valve is pressurised the pawl moves into said recess thereby locking said cover and said body together until depressurised.

*Sub A5)* 22. A valve body and cover as claimed in any one of claims 14 to 21, wherein said threaded portion of one or both of said cover and said body includes at least one groove extending generally laterally relative to the thread direction, said at least one groove permitting the exhaust of gas in said valve body once a seal between said cover and said body is broken.

23. A valve body and cover as claimed in any one of claims 14 to 22, wherein said engagement members can be protruding bosses, lugs, faces, pins, or any appropriate formation, or combinations of these, which can extend laterally or axially relative to the valve body and or cover.

24. An operator to open and close a control valve having:

a body member which is separate from said control valve but is connectable thereto, said body member having a first side with connection means for connection to said control valve and a second side to engage a valve member;

5 said body member including a passage communicating from said first side to said second side to allow gas from said control valve through said body member when connection has been made;

said body member including a seat around said passage on said second side, which is closable by said valve member, to open and close said passage when desired.

25. An operator as claimed in claim 24, wherein said valve member is movably held between said  
10 body member and a second member which connects to said body member.

~~Subj~~ 26. An operator as claimed in claim 24 or 25, wherein said body member can be made from a plate having on one side connection means to connect either directly or remotely to said control valve.

27. An operator as claimed in any one of claims 24 to claim 26, wherein said body member includes support members on said second side extending away therefrom.

15 28. An operator as claimed in any one of claims 24 to 27, wherein body member includes a peripheral wall therearound. 29. An operator as claimed in any one of claims 24 to 27, wherein said body member is generally cup shaped.

30. An operator as claimed in any one of claims 24 to 29, wherein said second member is a solenoid casing held by or which holds said body member.

20 31. An operator as claimed in any one of claims 24 to 29, wherein said second member is a tubular member or a ferrule tube, which is held by or which holds said body member, said tubular member in turn being held by or which holds a solenoid casing.

32. An operator as claimed in any one of claims 24 to 31, wherein said second member is held by support members on said body member so as to be kept a predetermined distance away from said seat.

25 33. An operator as claimed in any one of claims 24 to 32, wherein said second member has associated therewith a bias means to bias said valve member towards or away from said seat.

34. An operator as claimed in any one of claims 24 to 33, wherein said operator, when in use, is directly connected to said control valve.

30 35. An operator as claimed in any one of claims 24 to 33, wherein said operator, when in use, is connected to said control valve by means of a tube allowing said operator to be remotely located relative to said control valve.

36. An operator as claimed in any one of claims 24 to 35, wherein said body member has a plurality of ports formed therein to allow the escape of gas therethrough.

37. An operator as claimed in claim 36, wherein said plurality of ports are formed between a number  
35 of support members extending away from said body member.

~~Subj P1~~ 38. An operator as claimed in any one of claims 24 to 37, wherein said valve member is a plunger.